# Foale digs into his work as microgravity farmer

Astronaut Mike Foale is three weeks into his four-month stay on the Russian Mir Space Station, settling into his new home on orbit while setting up the hardware he'll use to conduct scientific investigations.

Today is the 21st day of Foale's four and a half months as a Mir crew member. Mir 23 Commander Vasili Tsibiliev and Flight Engineer Alexander Lazutkin are in their 117th day of their six-month mission.

Foale spent his second week aboard setting up special containment areas in which 64 black-bodied beetles, transported up on STS-84, will be exposed to special lighting conditions in a study of the effects of those conditions on the insects' circadian timing system while in microgravity. He's also preparing the Greenhouse Facility, which houses a biology experiment on plant growth in microgravity.

"We're doing a seed-to-seed experiment, which has never been done before in space, taking rape seed, which is related to broccoli, and growing them over a cycle of 30 to 40 days, three times we hope during my mission," Foale said. "I never was a farmer in my childhood, but I'm ready to be one now."

MIR-23 FOALE

Foale also has been working with his cosmonaut colleagues on station maintenance. This week the Mir crew conducted repairs to a cooling loop in the station's Kvant-1 module, continuing a job that began back in March. Once that loop is confirmed to be operating properly, it will provide cooling for the station's carbon dioxide removal system, which has been operating normally, but without cooling, since mid-April. The next major maintenance task for the cosmonauts will be installing the new Elektron oxygen generation system brought to Mir with Foale.

Astronaut Jerry Linenger let out "whoops" of joy as *Atlantis* neared the Kennedy Space Center Shuttle Landing Facility runway, bringing his four and a half months on orbit to a close May 24.

Linenger will spend the next several weeks in debriefings while working closely with his flight surgeons to assist his body's readjustment to gravity.

"I felt way better than I thought I would feel. There's some disorientation I think everyone feels after landing, but it was no different than a short-duration flight for me. I really thought it would be a lot tougher."

Foale's tour of duty on Mir is scheduled to continue into September, when the next increment in the Phase 1 Program will see the multinational crew of STS-86 bring Astronaut Wendy Lawrence to Mir to take over for Foale.

After a training session in Houston, Lawrence has returned to the Gagarin Cosmonaut Training Center in Star City, Russia, outside Moscow, to resume her preparations. Astronaut Dave Wolf, who will replace Lawrence, and his backup, Andy Thomas, are back in Star City this week after a Houston training session.

# JSC selects Space Ops contractors

## First step in merging NASA's command, tracking networks

JSC has selected Boeing North American Inc. Space Systems Division and Lockheed Martin Space Mission Systems and Services Inc., both of Houston, for award of fixed-price contracts for Phase 1 of the Consolidated Space Operations contract.

JSC is the lead center for NASA space operations under the direction of John O'Neill and the Space Operations Directorate.

The contract is the first step in a planned consolidation of NASA's communications, command and control and deep space tracking resources. The intent of this initiative is to achieve cost savings by reducing the management structure and realizing economies possible through private sector competition and innovation.

Each contract is for $4 million over a period of eight months, ending January 16, 1998. No other companies submitted proposals. The Phase 1 study will lead to the development of an integrated operations architecture for NASA space operations. Each contractor will independently develop an architecture.

JSC Photo 97-06615 by Steve Candler

**X-TREME INTEREST—U.S. Rep Joe Barton, R-Texas, right, gets a look at the new X-38 spacecraft being designed as an assured crew return vehicle for the International Space Station. In Bldg. 220, X-38 Project Manager John Muratore explains details about the spacecraft's design, which is based on old experimental lifting body designs. Standing with Barton is his legislative aide, Brandon Steinmann. U.S. Rep. Kevin Brady, R-Texas, accompanied Barton on the May 5 fact-finding trip to JSC.**

# First space station commander says integration key

The commander of the first International Space Station crew says "integration" will be the main objective of his 1999 mission with two Russians.

Commander Bill Shepherd, Soyuz Commander Yuri Gidzenko and Flight Engineer Sergei Krikalev—all veteran space travelers—will have their work cut out for them when they launch aboard a Russian Soyuz spacecraft in January 1999 to begin a permanent human presence aboard the station.

"We're talking about an unprecedented event here, where we're assembling large pieces of a vehicle that for a lot of good technical and programmatic reasons we can't fully assemble and check out on the ground," Shepherd said during the crew's first news conference. "The engineers and designers are going to do a good job giving us hardware that's workable, but we have to have a profound understanding of what the hardware is trying to do, because I anticipate not everything is going to go as planned."

**Shepherd**

Shepherd, Gidzenko and Krikalev are scheduled to follow by seven months the first component of the station, targeted for launch in June 1998. The crew began training last year for a flight that is to exceed four months.

**Krikalev**

Shepherd, who has made three space shuttle flights as a mission specialist and was deputy manager of the International Space Station Program, said training activities are picking up speed as the crew learns about American and Russian hardware components they will be integrating.

Krikalev, with two flights on Mir and one flight aboard the space shuttle under his belt, said he expects some difficulties and that changes in the station assembly sequence are to be expected.

**Gidzenko**

"My personal feeling is that we should expect some problems. Space flight is still testing equipment, and in this case we put together very many new systems and they are going to operate a little bit differently," Krikalev said. "Changing the recent plans makes our flight more interesting, because the initial plan was for us to fly in the configuration (where) only the Service Module, FGB, and the Node (are present)," Krikalev said. "But now, right in the middle of our flight—because our flight was delayed—the lab will come in the middle of our flight, so we will have a lot of interesting things to do."

Gidzenko, a colonel in the Russian Air Force, a Mig-23 pilot, and a veteran of the Euromir-95 mission, said titles won't mean much during the mission.

"I am glad to be on the first crew of the International Space Station," Gidzenko said. "It doesn't matter who will be commander or flight engineer or pilot. We will work together and try to do our best."

# Ukranian payload specialist to fly on STS-87

Col. Leonid Kadenyuk will be the first Ukrainian to fly on a U.S. space shuttle as the primary payload specialist for the fourth U.S. Microgravity Payload flight scheduled for a November 1997 launch on *Columbia* and STS-87.

The announcement was made May 16 as the first session of the U.S./Ukraine Binational Commission convened at the White House. The Commission is co-chaired by Vice President Al Gore and Ukrainian President Leonid Kuchma.

NASA also named another Ukrainian, Dr. Yaroslav Pustovyi, to serve as an alternate. As an alternate payload specialist, Pustovyi will undergo the same training as Kadenyuk and will be ready to serve on the mission crew if necessary.

Kadenyuk will conduct the Collaborative Ukrainian Experiment, a series of 11 shuttle middeck experiments focusing on the effects of microgravity on plant growth and pollination.

The project resulted from the November 1994 summit meeting between President Bill Clinton and Ukrainian President Leonid Kuchma. At that time, the two presidents signed the Agreement Between the United States of America and Ukraine on Cooperation in the Exploration and Use of Outer Space for Peaceful Purposes and announced that a Ukrainian representative would fly on a future space shuttle mission.

U.S. and Ukrainian scientists will collaborate on the plant experiments to be carried out by the Ukrainian payload specialist during the flight. The 11 investigations, which use the shuttle's Plant Growth Facility and Biological Research in Canisters hardware, consist of five primary and six secondary experiments.

Six U.S. and 16 Ukrainian principal investigators are collaborating on the experiments, which will study the effect of microgravity on pollination, fertilization and flowering of plants and seedlings. The research also furthers the study of previously observed abnormal growth and developmental phenomena involving plants in space.

Kadenyuk was selected as a Russian cosmonaut in 1976. He has trained for and studied systems for the Soyuz, Soyuz-TM, MTKK, Buran, and Space Stations Salyut and Mir. He was born in the village of Klishkovtsiy in the Khotinsky Region of the Chernovitsky District. He is employed by the Kiev Botanical Institute of the National Academy of Sciences of Ukraine.

Pustovyi is a graduate of the Military Space-Engineer Academy, and received a doctorate in Radio Physics from Kharkiv State University. He is employed by the Institute of Magnetism at the National Academy of Sciences of Ukraine.

The other members of the STS-87 crew are Commander Kevin Kregel, Pilot Steven Lindsey and Mission Specialists Winston Scott, Kalpana Chawla and Takao Doi.

# *Columbia* work on track to set processing flow record

**By Kyle Herring**

With *Atlantis* back home following its sixth mission to dock with the Mir Space Station, mission planners turn their attention to preparations of *Columbia* for the reflight of the Microgravity Science Laboratory, which was cut short last month.

*Columbia* had to make an early return to Earth after one of its fuel cells experienced voltage shifts that were not fully understood at the time.

The MSL-1 reflight, labeled STS-94, will be the 23rd mission of *Columbia* and the 85th since the shuttle began flying. Launch currently is targeted for 1:37 p.m. CDT, July 1, at the opening of a two and a half hour launch window. Flight managers will meet June 19 to review preparations and select the actual launch date.

Vehicle processing has gone as smoothly as possible, allowing for *Columbia* to be moved this week from its hangar in Orbiter Processing Facility to the Vehicle Assembly Bldg. for mating to its external tank and solid rocket boosters. Rollout to the launch pad atop the Mobile Launch Platform and crawler is scheduled for Wednesday, June 11.

Prior to rollout, inspections of *Columbia*'s forward reaction control system revealed cracks in several thermal protective tiles which will require replacement. Work to replace those tiles will be performed at the pad and should have no affect on the launch schedule.

STS-94 COLUMBIA

Additional wiring work in *Columbia*'s cargo bay caused the Spacelab transfer tunnel installation to slip a day, but technicians made up the time and kept *Columbia* on its roll out schedule. Some of the wiring work will be carried to the launch pad, and is not expected to affect the final weeks of the launch flow.

If STS-94 launches on July 1, *Columbia*'s processing flow would be the shortest since return to flight by four days eclipsing the 86-day flow of the orbiter between the STS-58 and STS-62 missions in late 1993 and early 1994.

The reflight of MSL-1 also will mark the fastest turnaround for a crew. Commander Jim Halsell, Pilot Susan Still, Mission Specialists Janice Voss, Mike Gernhardt and Don Thomas, and Payload Specialists Roger Crouch and Greg Linteris will break the 128 day flight-to-flight record of Steve Nagel, set on STS-51G and STS-61A in 1985.

If *Columbia* launches on time, landing would occur 16 days later on July 17 just after sunrise. The actual planned mission duration is 15 days, 16 hours, 46 minutes.